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NOTES ON THE HORDEUM JUBATUM COMPLEX

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Mitchell and Wilton (1964) examined the *jubatum-caespitosum-brachyantherum* complex in Alaska. Their report contains interesting information on the behaviour of the complex at the northern border of the North American population. They concluded that there is "little support for combining the Alaskan populations of *H. brachyantherum* with *H. jubatum*." If the word "Alaskan" is omitted then the conclusion is at variance with the one suggested by Rajhathy and Morrison (1959; 1961) and with the taxonomic treatment of this group by Bowden (1962). Although Mitchell and Wilton dealt with Alaskan populations which are only a small peripheral fraction of the whole North American population, they generalize from their data and propose to maintain species status for both *jubatum* and *brachyantherum*. Since in their generalization they disregard a mass of evidence obtained on the populations of the Canadian and American West and Midwest as well as in the experimental garden, a brief discussion of the problem seems to be warranted. This paper is contribution No. 139 from the Research Station, Canada Department of Agriculture, Central Experimental Farm, Ottawa.

Species relationships should be assessed in the light of the biological species concept. Thus, interbreeding should be recognized as the main criterion of conspecific status. Mitchell and Wilton stated that *H. brachyantherum* and *H. jubatum* fail to "hybridize on many sites where they are in contact." This appears to be the case in Alaska. Although they located a few hybrid populations, their future remains doubtful. The authors may be right because the extreme environment of Alaska may not provide the ecological niche for successful competition or introgression. However, even if this were the case, generalizing from a specialized peripheral situation cannot be considered valid. When interbreeding between two species populations is examined surely greater significance should be assigned to those sites where hybridization does occur than to those where it does not. Large hybrid swarms exist in the Canadian and American West and Midwest. These became well established also in areas such as Saskatchewan and Manitoba where only *H. jubatum* occurs and *brachyantherum* is absent (Bowden, 1962). Thus, they not only maintain themselves but also migrate from the original sites.

Hybridization is a prerequisite of interbreeding, the fertility of the hybrids being a more sensitive indicator of the degree of relationship than crossability alone. Using these in evaluating relationships the breeding system of the parental species and isolation mechanisms should be considered. Both *jubatum* and *brachyantherum* are inbreeders, hence it is not surprising that they do not hybridize at some sites of contact. Inhibited embryo development in interspecific hybrids is a very characteristic isolation barrier in the *Hordeum* genus (Rajhathy *et al.*, 1964). In view of this, the absence of this barrier in the *jubatum-brachyantherum* group must be considered very important. Some advanced generation hybrid strains are fertile to the extent that they are just as troublesome weeds as *H. jubatum*. Failure of seed set is not likely to be an isolation barrier even in Alaska where one plant in a relatively small sample had 47 per cent seed set. The chances for superior and fertile combinations are much better in nature than in the nursery where usually only a few genotypes are involved. A wide array of types segregate in F_3 and F_4 generations for awn length which is the best character differentiating the parental taxa. The natural hybrid swarms are more similar morphologically to *jubatum* than to *brachyantherum* because *jubatum* is usually the recurrent parent.

The abundance of natural hybrids and the partial fertility of the F_1 hybrids in the nursery are indicative of a relatively regular gametogenesis. Some irregularities in chromosome pairings were noted in the hybrids (Rajhathy and Morrison, 1959). However, a sufficient amount of good pollen grains was produced to secure good seed set. Thus, it is surprising that Mitchell and Wilton were unable to record chromosome pairing at first metaphase because of the incidence of irregularities.

The taxonomic treatment of the *jubatum* group by Bowden was based on experimental results obtained by cytogenetical methods and reflected biological relationships. The interesting data of Mitchell and Wilton make the information more complete but do not change the overall pattern of species relationships in this important group.

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